DIOXIN CLEAN-UP PLAN
VILLAGE OF SAUGET
April 21, 1983

I. INTRODUCTION

This plan outlines a safe method of removal and interim storage of dioxin contaminated soil from the site of a pump station. The pump station is an integral part of the construction of the American Bottoms Regional Wastewater Treatment Facility. Timely completion of this clean-up is critical to the construction schedule of the facility.

Soil contamination appears to have occurred when a tank, previously located at the south-end of the construction site, was used to store contaminated oil by a Missouri-based waste oil hauling firm. Oil from the tank apparently seeped into a depressed area where it was contained. This tank has since been dismantled and a part of the area paved over.

Contaminated soil removal will be accomplished using standard construction equipment; however, workers will be equipped with protective clothing and breathing apparatus. Soil will be stored onsite in a double lined and drained storage facility covered with both a synthetic and earth cap. Expected necessary life of the facility is five years. The safe useful life, however, should exceed twenty years. Upon completion of the storage facility, work must proceed in developing a permanent method of disposal of the material.

II. TASKS PRIOR TO EXCAVATION OF CONTAMINATED SOIL

A. Contaminated Site

The first construction action is to adjust the existing fencing to secure the proposed excavation limits. Fence location must allow

adequate room to manipulate equipment during excavation and loading, and more importantly enclose a small potentially-contaminated area on the northwest edge of the present fenced area. Existing lighting must be rotated to illuminate the area for continuous construction activities, and signs must be posted surrounding the site to warn of a chemical clean-up area. Then a berm must be constructed around the outside of the fence to limit additional storm water intrusion.

A horizontal grid system with vertical control will be established on the site perimeter consisting of grade stakes set on 25 foot centers outside the present fenced-in area. An expanded sampling program will then be conducted in the contaminated area.

The paved parking lot immediately south of the contaminated area, but within the existing fence, is to be used as the staging area. This area will provide the transition zone between the excavation site and the clean surrounding area. A mountable curb is to be constructed around the perimeter of the paving. A sump pit consisting of a 24" PVC pipe and a pump must be installed in the lowest point of the paved area for use in pumping clean up water.

Materials presently stored within the excavation site must be cleaned with a high pressure (steam) detergent wash and removed. The paved area must also be cleaned and the debris retained for inclusion into the contaminated soil storage cell. The gravel within the contaminated area will be used in building the storage cell, thus not wasted.

As the site is being readied, the sampling program will commence. The person taking the samples will record the grid location, ground elevation and the sample depth. Discriminant samples will be taken

at the ground surface and at predetermined depths up to five feet. An attempt will be made to determine if the soil sample is from a filled area or original ground. Samples will then be analyzed for dioxin.

These analyses along with the original analyses will form the basis for determining extent of contamination of the soil in the area of Contract F. A determination can then be made whether the contaminants are migrating through the soil, or are being held immobile near the surface as is suspected. The attached drawing shows locations for the additional samples as presently proposed, and Table 1 presents the recommended depth frequency of sampling at each location.

Analyses will be run in a sequence that minimizes costs and maximizes allowable turnaround time. For instance, initial analyses would likely be run for the 0"-6", 6"-18", and 0"-30" samples. Depending on these results, it will be determined whether additional tests are warranted. If contaminated to greater than 1 ppb with dioxin, the contaminated soil will be removed and stored.

It is expected that analyses, profiling of excavation limits and actual excavation will occur somewhat concurrently. If time permits, however, drawings will be submitted to the State and Federal regulatory agencies for approval. Regardless, it will be necessary for these agencies to approve the clean-up plans and specifications, issue any required permits, and expedite a construction change order.

3. Storage Cell

A lined storage cell is to be constructed south of the entrance road and north of the former lagoon area. Storage volume for the cell can

be varied between 900 cu. yds. and 1400 cu. yds. by adjusting the final slope of the sidewalls from a 5:1 ratio to a 3:1 ratio. If additional cells are needed, the area can accommodate up to three such cells.

The area where the cell is to be built must first be graded flat to approximately elevation 408. An 18" diameter storm culvert must also be laid under the entrance road to drain the area. A compacted clay pad, uniformly sloping from 3.75 feet height at the perimeter to 1 foot at the center must then be laid on the graded area.

A trench must then be cut to slope on grade from the center of the clay pad toward the outer edge. Two 4 inch diameter schedule 40 PVC pipes must be laid in the trench and clay carefully recompacted around the pipes. The pipes will run into a six foot diameter manhole constructed at the outer edge of the clay pad. A valve will be placed at the end of each pipe in the manhole.

A four inch thick layer of compacted sand must be spread on top of the clay pad. The sand layer will drain into a filter fabric envelope enclosing a stone bed. The stone bed will drain through a perforated pipe into one of the 4 inch pipes. At the edge of the clay pad, a 1.5 foot deep by 8 inch wide anchor trench must then be cut around the perimeter of the clay pad. At this point, the storage cell will be ready for laying the liner.

The liner is to be fabricated into a 100 foot square and made of 30 mil thick Hypalon or CPE. All seams must be factory welded and the liner delivered to the site in one piece. A 4 inch drain "boot" must be located in the center of the liner. Fabrication time is

The liner is to be unrolled on the sand layer starting at one edge and working toward the opposite edge. When the center is reached, a connection to the remaining 4 inch pipe must be made. During the entire liner installation, a factory representative must be present to certify the integrity of the liner. After complete unrolling, the liner must be tucked into the anchor trench and another sand layer placed over the liner. This 4 inch thick sand layer will again drain to a fabric envelope surrounding the drain pipe. Finally, a layer of filter fabric must be laid on top of the sand. At this point, the storage cell will be ready to receive the contaminated soil.

A short road should be constructed of crushed stone from the access road to a shallow dumping pit adjacent to the storage cell. The pit will have a railroad tie perimeter wall to provide a positive stopping area for the trucks and contain dumped material. Existing lights in this area must also be rotated to illuminate the unloading pit and storage cell.

III. TASKS DURING EXCAVATION OF CONTAMINATED SOIL

A. Dewatering Plan

If it is determined during the sampling program that the contaminants have been immobile in the soil, the existing dewatering system at the Physical-Chemical Plant can be used to aid in drying the excavation site. It is also possible that the Contractor can install shallow temporary dewatering wells. If the contaminants appear to have migrated through the soil, the water will be carefully removed with surface pumps to avoid suspension of soil particles. The water would then be treated in an activated carbon filter unit prior to discharge

to the Physical-Chemical Plant. The filter unit must be disposed of as a hazardous waste when changed.

B. Excavation Plan

The first step in the excavation plan is to set up the shower trailer and decontamination room. This includes connection of the water supply, electricity, and wastewater holding tank. Wastewater from the trailer must also be treated with activated carbon prior to discharge to the Physical-Chemical Plant.

Excavation is estimated to require up to 72 hours to complete. The potential for 12 hour shifts is possible to limit down time lost to personnel clean-up activities.

Traffic will be temporarily diverted around the ABRWWTF construction site through the Physical Chemical Plant and to Clayton Chemical along Mobil Avenue. Sludge hauling trucks from the P-Chem Plant will be routed out through the plant. Access to the contaminated site, haul route, and storage cell will be restricted to authorized personnel only.

Samples of soil with a known level of dioxin contamination will be placed in a 55 gallon drum and packaged as a hazardous waste. This sample will be used for analytical work in determining a final method of disposal of the contaminated soil.

Excavation will consist of a two stage operation with a dozer pushing to a pile near the loading area and a clam shell loading from the pile to the trucks in the staging area. The dozer will begin working from the northern end of the contaminated site and work around the

perimeter toward the south, cutting to near final grade. After an area is cut to near final grade, the dozer will back grade with the blade to final grade to avoid tracking the decontaminated area. Once final grade is attained, crushed stone will be placed over the area with an uncontaminated loader to mark the clean zone. This operation will be continued until the final grade is reached and clean stone is spread over the entire excavation site.

During the truck loading operation, spotters will be located in the decontaminated area to shovel spillage back into the loading pile. Care must be exercised not to track any contaminated soil from the decontaminated zone onto the haul road.

C. Storage Cell Filling Plan

Loaded trucks will back to the retaining stop and unload into the pit. Contaminated soil will be removed from the pit and placed into the storage cell with another clam shell. Spotters will again shovel spilled material into the storage cell. When an area is filled to near final grade, a small dozer will be brought onto the pile for final grading.

Upon completion of the excavation and hauling activities, the railroad tie retaining wall will be removed and taken to the cleaning area for wash down. After washing, the ties will be placed in a remote area, doused with fuel oil, and burned, if acceptable to the EPA. The bottom and sides of the unloading pit will be excavated and placed in the storage cell. The stone roadway near the pit will be excavated and placed on top the mound to serve as a vent.

This will essentially complete construction of the mound at which time all equipment can be taken to the decontaminated area for wash down. Water from the wash down must be treated, as previously stated, before discharge to the treatment plant. All solids from the wash down operation will be included in the storage pile.

The excess bottom liner material will be folded onto the storage pile. A synthetic cap of similar construction to the liner will be unrolled over the mound. When the apex of the mound is reached, a 3 inch diameter steel vent pipe must be installed through a boot in the cap into the stone. A sand cap will then be placed on the stone to prevent abrasion of the synthetic cap. Unrolling of the cap can then be continued on the downhill slope and lapped over the liner.

A toe of slope around the clay pad and a final one foot thick cover over the mound will be constructed of clean soil excavated from the Effluent-Pump Station construction.

IV. SAFETY PRECAUTIONS

A. Safety Facilities

The work site must be clearly divided into contaminated, decontaminated, and clean zones. Unauthorized people must be kept off-site. In the event of an accident resulting in personal injury or contamination, emergency equipment and facilities will be on-hand. If a worker is contaminated, he should be moved to the shower immediately where contaminated soil or liquid can be washed off. A telephone or two-way radio will be kept on-site to alert medical or fire fighting authorities of any emergency. A changing facility on-site will be provided for workers. Contaminated, disposable suits are to be

removed outside the change room. Running water will be provided for washing hands and face before eating or leaving the work site. Clean "street clothes" can be stored in the change room during working hours.

B. Personnel Safety

Personnel on-site should be divided into two distinct groups; those who will be walking around the site, and those who can remain inside the cabs of trucks, cranes, etc. Workers who drive trucks will not be allowed out of the trucks in a contaminated zone. This measure will limit the number of workers who might be exposed to contaminated soil or liquids.

All personnel which will be in the excavation or storage area must have completed a baseline physical examination meeting the U.S. EPA guidelines for hazardous waste work within the 12 months prior to site work. Personnel who have not had such a physical may not be authorized to enter the site, even for a short period of time.

All workers will be informed of the potential risk of working around hazardous materials. A signed statement from each worker will be acquired stating they have been so informed.

Tyvek disposable suits will be worn by all personnel. These suits have hoods and boots. In addition, gloves shall be worn. All personnel must also be equipped with respirators containing cartridges for organic vapors and dusts. These masks must be worn at all times.

Those personnel who will be walking on any of the contaminated areas will be equipped with disposable boots. In addition, cotton coveralls to be worn under the Tyvek suit should be provided. This will eliminate

the chance of carrying contamination off-site on street clothes. These coveralls must also be disposed of at the end of the project.

There should be at least two workers in the field at all times. In case of injury, there will be another properly equipped worker available for rescue. Workers who will be in the field should change the cartridges in their respirators at least twice a day. To prevent the site from becoming dusty, a water spray will be utilized as necessary.

C. Equipment Clean-Up

Care must be exercised at all times to prevent the spread of contamination off-site. All equipment which has come into contact with contaminated soil must be decontaminated. This includes dump trucks, earthmoving equipment, shovels, etc. To minimize the generation of wastewater, the following procedure is suggested.

Earthmovers - When excavating is complete, the equipment must be cleaned of as much soil as possible. Shovels, wire brushes, and putty knives should be used to clean off the equipment. The soil removed can be added to the last truck load of contaminated soil being taken to the storage location.

Trucks - When the dump trucks have unloaded their last load into the storage location, they should remain there while the truck bed is cleaned as described above. The soil removed should be added to the storage location.

Washing - The washdown area will be used to remove the last traces of contaminated soil from the equipment and collect wastewater for treatment.

V. ESTIMATED EXCAVATION AND STORAGE FACILITIES COST

Preparing an accurate cost estimate for the storage cells and contaminated material excavation is difficult until the detailed sampling program is complete. The sampling program will, of course, define the depth of excavation required and set the quantity of material handled.

For this preliminary cost estimate, it is assumed that two storage cells will be required. This allows up to 2800 cu. yds. of contaminated material storage area. By developing two separate storage cells, the surface material, with suspected higher contamination, can be segregated from the deep or less contaminated material. This could aid in the final disposal operation. Preparing a cost estimate is also complicated by the uncertainty of delays in excavation due to health and safety considerations. Under normal conditions, excavation of this quantity of material would be complete in about 24 hours; however, under the expected conditions, up to 72 hours is estimated.

It is estimated that the cost of preparing two storage cells, excavation of the contaminated material, the engineering, safety, and analytical services will total between $400,000 and $500,000.

VI. ULTIMATE DISPOSAL OPTIONS

Currently, the feasibility of utilizing the American Bottoms Regional Wastewater Facility to decontaminate the soil is being investigated. Considerable further research and testing will be necessary, however, before one can determine if the powdered activated carbon regeneration system is capable of destroying the contaminants. Work on this disposal option should be continued (as an innovative technology solution to the problem) as well as investigating more or less conventional disposal methods.

TABLE 1

PROPOSED SOIL SAMPLING PROGRAM
IN CONTRACT F AREA

SAMPLE NO.	SAMPLING INTERVAL
17, 18	6"-18", 18"-30", 30"-42"
19, 20, 21, 22, 23, 24, 25, 26, 27	0"- 6", 6"-18", 18"-30", 30"-42"
28, 29, 30, 31, 32, 33, 34, 35	30"-40", 40"-50", 50"-60"